Bill Williams Watershed Water Quality Assessments

Watershed Description

The Santa Maria River and the Big Sandy River drainages merge at Alamo Lake to create the Bill Williams River, which connects to the Colorado River at Parker Dam. Land ownership is divided approximately as 45% federal, 28% state, and 27% private (no Tribal lands). With only 8,000 people (2000 census), this watershed does not have any large population centers. Open range grazing is the principal land use. A large mining complex is located in the Bagdad area, while historic mine sites are scattered throughout the watershed.

Elevations range from 8,417 feet (above sea level) at Hualupai Peak to 1,000 feet near the Colorado River. Most of the watershed is below 5,000 feet, with low desert fauna and flora (Sonoran Desert - Mohave Desert transition area) and warmwater aquatic communities where perennial waters exist.

Water Resources

There is little precipitation, from 13 inches a year, with an additional inch of snowfall per year in higher elevations, so surface water resources are sparse. Perennial flow in this watershed is frequently interrupted (short segments), even on the larger main-stem rivers. The largest lake, Alamo Lake, covers 11,950 acres; however, only an estimated 1,415 acres are perennial.

An estimate of surface water resources in the Bill Williams Watershed is provided in the following table, based on USGS digitized hydrology at 1:100,000, rounded to the nearest 5 miles or 5 acres.

Estimated Surface Water Resources in the Bill Williams Watershed

	Perennial	Intermittent	Ephemeral
Stream miles	185	655	5035
	Perennial	Non-perennial	
Lake acres	1832	11,950	

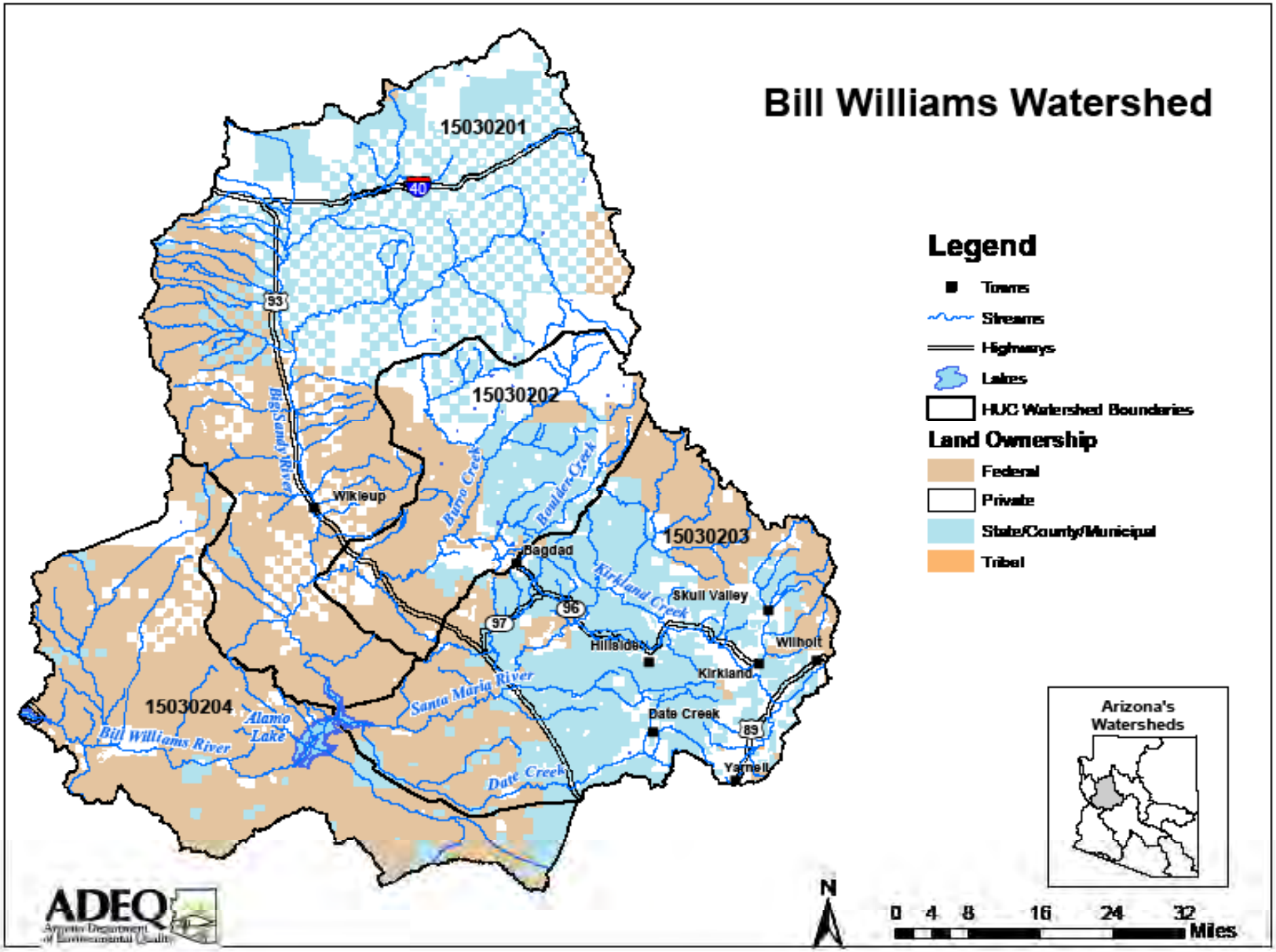
Ambient monitoring focuses on perennial waters; however, special investigations may identify water quality problems on intermittent and even ephemeral waters.

Assessments

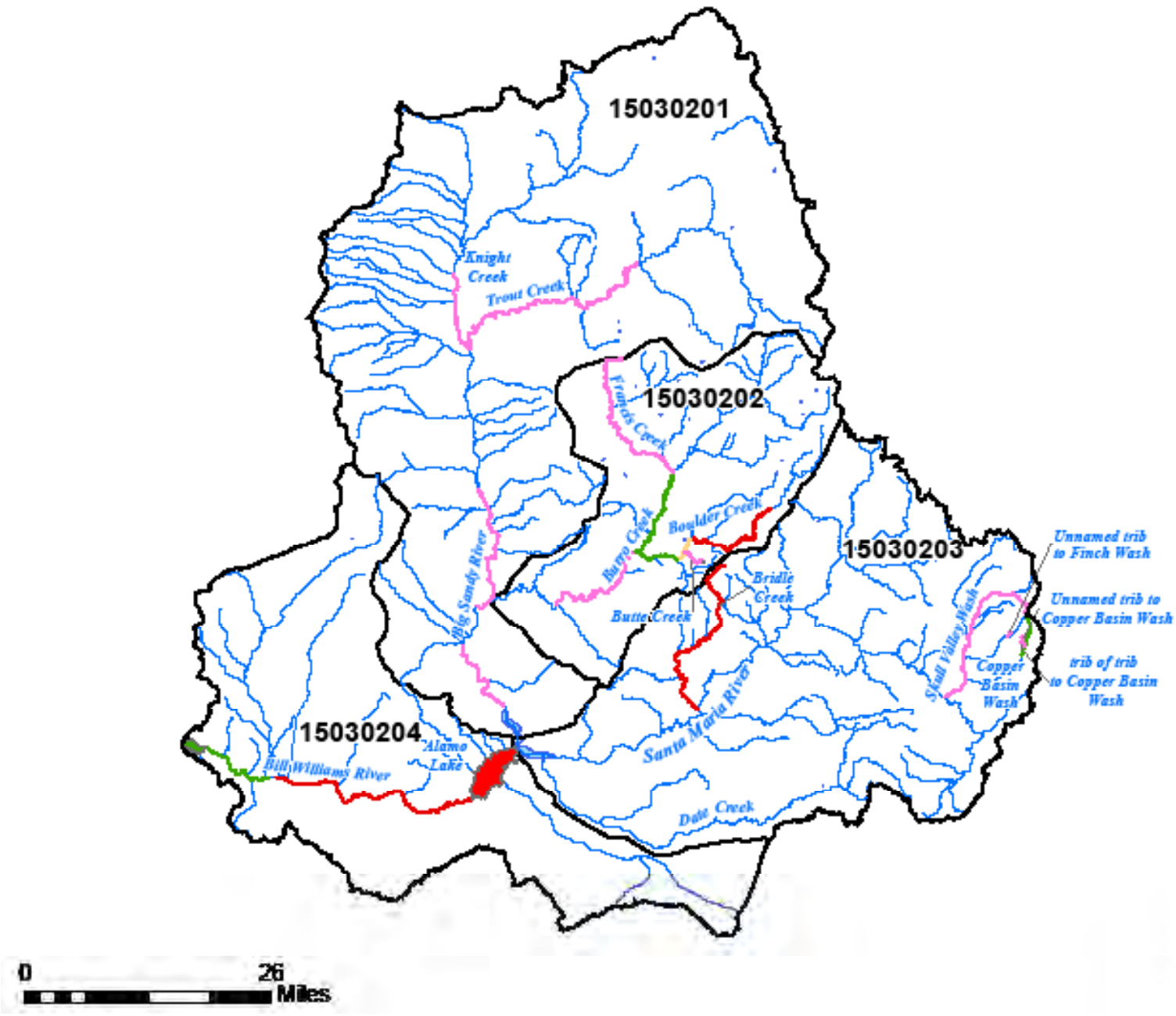
The Bill Williams Watershed can be separated into the following drainage areas in Arizona:

15030201	Big Sandy River
15030202	Burro Creek
15030203	Santa Maria River
15030204	Bill Williams River

These drainage areas and the surface waters assessed as “attaining” or “impaired” are illustrated on the following watershed map. Methods used to complete these assessments are described in the “Surface Water Assessment Methods and Technical Support” document.


Bill Williams Watershed
15030201
15030202
15030203
15030204
Legend
Towns
Streams
Highways
Lakes
HUC Watershed Boundaries
Land Ownership
Federal
Private
State/County/Municipal
Tribal
Wikieup
Big Sandy River
Burro Creek
Boulder Creek
Bagdad
Kirkland Creek
Skull Valley
Hillside
Wilhoit
Kirkland
Santa Maria River
Date Creek
Yarnell
Alamo Lake
Bill Williams River
Arizona's Watersheds
N
0 4 8 16 24 32
Miles
ADEQ
Arizona Department of Environmental Quality

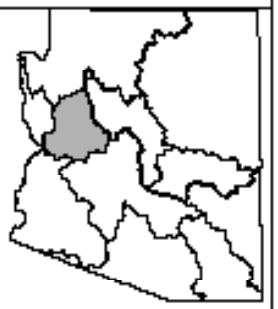
Bill Williams Watershed
2012/2014 Assessment for Streams and Lakes



Legend

Assessed Lakes - 2012
ADEQ and EPA Listings
- Attaining
- Inconclusive
- Not Attaining
- EPA Impaired
- Impaired
- HUC Watershed Boundaries

Assessed Streams - 2012
ADEQ and EPA Listings
- Attaining
- Inconclusive
- Not Attaining
- EPA Impaired
- Impaired
- Lakes
- Streams



See Individual HUC Printouts for Waters not Labeled

N

ADEQ Arizona Department of Environmental Quality

A LAMO LAKE

15030204-0040A
1415 Acres

Category 5
Impaired

High pH (1996), ammonia (2004), and mercury in fish tissue (EPA, 2002)

IMPAIRMENT STATUS

FC - Impaired • FBC - Impaired • AGL - Impaired
A&Ww - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Ammonia	0.24 ng/L	8/14/2006	0.28 mg/L	A&Ww chronic is inconclusive
pH	9.2 SU	8/7/2007	9.4 SU	AGL, FBC & A&Ww are inconclusive (binomial)
DO	5.8 mg/L	7/4/2006	5.5 mg/L	A&Ww is inconclusive (binomial)

Monitoring Summary

Sampling period: 7/4/2006 - 8/22/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
Across From Picnic Area (Mid Lake)	BWALA-NLS	105779	ADEQ	Clean Lakes Program
At Dam (Lower Lake)	BWALA-A	101350	ADEQ and COE	Clean Lakes Program, Ambient
Upper Lake	BWALA-B	101351	ADEQ and COE	Clean Lakes Program, Ambient
Mid Lake	BWALA-C	102514	ADEQ and COE	Clean Lakes Program, Ambient
Site 1 (Lower Lake)	BWALA-1	100001	COE	Ambient
Site 3 (Upper Lake)	BWALA-3	100003	COE	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(5) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(4-5) Ammonia, nitrite/nitrate, nitrogen, phosphate, phosphorus, total Kjeldahl nitrogen	(5) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	pH, DO, ammonia
Missing Core Parameters	copper(dis &tot), cadmium, zinc, lead, *E. coli*
Missing Seasonal Distribution	All core parameters
Lab Detection Limits Not Low Enough	

Priority	Monitoring Recommendations
High	Collect dissolved oxygen, pH, and ammonia samples to support development of a nutrient TMDL. Use a more sensitive/reliable analytical method for hydrogen sulfide. Collect core parameters to represent at least 3 seasons during an assessment period.

Impairment Discussion
Lake remains impaired for high pH (1996), ammonia (2004), and mercury in fish tissue (2002).

BIG SANDY RIVER

Rupley - Alamo Lake North
15030201-001
10.2 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Bottom deposits	50%	5/18/2010	100%	A&Ww is inconclusive with only 1 exceedance during the assessment period.

Monitoring Summary

Sampling period: 12/9/2009 - 5/18/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
NEAR WIKIEUP, AZ	BWBSR015.60	100457	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-3) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, bottom deposits

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	*E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect bottom deposits samples due to the exceedance. Collect core parameters to represent at least 3 seasons in an assessment period.

BIG SANDY RIVER

Stove Spring - Sycamore
15030201-006
2.8 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
SSC	80 mg/L	12/9/2009	110 mg/L	A&Ww is inconclusive. Only 1 single sample exceedance. Not enough samples to calculate a median.
Bottom deposits	50%	4/21/2010	98%	A&Ww is inconclusive. Only 1 exceedance in the assessment period.

Monitoring Summary

Sampling period: 12/9/2009 - 4/21/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
EAST OF WIKIEUP	BWBSR037.79	107384	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-3) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, bottom deposits

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Bottom deposits, SSC
Missing Core Parameters	Dissolved oxygen
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), copper, *E. coli*, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect additional suspended sediment and bottom deposits samples due to exceedances. A minimum of 4 suspended sediment samples within a 2-year period is needed to calculate a median. Collect core parameters to represent at least 3 seasons in an assessment period.

BIG SANDY RIVER

Sycamore - Burro Creek
15030201-004
13.8 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Dissolved oxygen	6 mg/L	5/18/2010	5.41 mg/L	A&Ww is inconclusive. 1 exceedance in 3 samples (binomial).
SSC	80 mg/L	12/16/2009	226 mg/L	A&Ww is inconclusive. Only 1 single sample exceedance. Not enough samples to calculate a median.
Bottom deposits	50%	5/18/2010	100%	A&Ww is inconclusive. Only 1 exceedance during the assessment period.
Biocriteria	IBI ≥ 50 attaining IBI 40-49 inconclusive IBI ≤ 39 violating	6/14/2010	IBI 46	A&Ww is inconclusive.

Monitoring Summary

Sampling period: 12/16/2009 - 5/18/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT HIGHWAY 93 BRIDGE	BWBSR034.68	100400	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-3) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, bottom deposits, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Dissolved oxygen, SSC, bottom deposits, biocriteria
Missing Core Parameters	None
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect additional dissolved oxygen, suspended sediment, and bottom deposits samples due to exceedances. Collect an additional macroinvertebrate sample to verify the bioassessment result. Collect core parameters to represent at least 3 seasons in an assessment period.

BILL WILLIAMS RIVER

Alamo Lake - Castaneda Wash
15030204-003
35.9 Miles

Category 5
Impaired

Impairment Status

Ammonia and high pH (2006)

FC - Inconclusive • FBC - Impaired • AGL - Impaired
A&Ww - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Selenium	2 ug/L	2/22/2010	2.1 ug/L	A&Ww is inconclusive with 1 exceedance.
Biocriteria	IBI ≥ 50 attaining IBI 40-49 inconclusive IBI ≤ 39 violating	6/10/2010	IBI 43	A&Ww is inconclusive with 2 inconclusive IBI scores at 2 sites.
		6/10/2010	IBI 45	

Monitoring Summary

Sampling period: 7/4/2006 - 6/10/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT ABOVE GROUND PIPELINE	BWBWR025.86	107385	ADEQ	Ambient
BELOW ALAMO DAM	BWBWR038.52	102316	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(6) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3-9) Ammonia, nitrite/nitrate, nitrogen, phosphate, phosphorus, total Kjeldahl nitrogen	(6-9) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Selenium, biocriteria
Missing Core Parameters	None
Missing Seasonal Distribution	Zinc (dissolved), cadmium (dissolved), copper (dissolved), *E. coli*, copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
High	Collect more total selenium samples to assess A&W attainment. Collect an additional macroinvertebrate sample to verify the bioassessment result. Many core parameters in need of seasonal coverage.

Impairment Discussion
Reach remains impaired for ammonia and high pH (2006).

BILL WILLIAMS RIVER

Mohave Wash - Colorado River
15030204-001
17.5 Miles

Category 2
Attaining some uses

FC - Inconclusive • FBC - Attaining • AGL - Inconclusive
A&Ww - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 8/31/2006 - 4/23/2006

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT MINERAL WASH, NEAR PLANET USGS 09426600	BWBWR009.92	100924	USGS	USGS Ambient
AT LAKE HAVASU, AZ.	BWBWR003.45	105129	USGS	USGS Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
None	(4-5) Nitrate, nitrite, nitrite/ nitrate, nitrogen, phosphate, phosphorus, total Kjeldahl nitrogen	(5) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), copper, lead
Missing Seasonal Distribution	Zinc (dissolved), copper, lead
Lab Detection Limits Not Low Enough	None

Priority	Monitoring Recommendations
Low	Copper, lead, and dissolved zinc need sample and seasonal coverage.

BOULDER CREEK

Butte Creek - Copper Creek
15030202-005B
1.8 Miles

Category 4A
Not attaining

Arsenic (1998)

FC - Attaining • FBC - Not Attaining • AGI - Inconclusive
AGL - Inconclusive • A&Ww - Not Attaining

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Arsenic	30 ug/L	1/22/2007	42.6 ug/L	FBC remains not attaining. A minimum of 10 samples is required to determine attainment. No new data since the last assessment.

Monitoring Summary

Sampling period: 7/12/2006 - 12/5/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COPPER CREEK	BWBOU005.15	102193	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(1-5) Arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	None	(5) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Dissolved oxygen, *E. coli*, boron, lead
Missing Seasonal Distribution	Dissolved oxygen, *E. coli*, boron, lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
Medium	Collect arsenic samples during critical conditions and in critical locations. Collect core parameters to represent at least 3 seasons during an assessment period. Use a lower lab reporting limit for dissolved cadmium.

Impairment Discussion
Reach remains impaired for arsenic (1998). TMDL for arsenic completed in 2004. The Hillside mine, located upstream of this reach, continues to degrade water quality. Additional sampling under critical conditions is needed to determine attainment of water quality standards.

BOULDER CREEK

Copper Creek - Burro Creek
15030202-005C
4.5 Miles

Category 2
Attaining some uses

FC - Attaining • FBC - Inconclusive • AGI - Inconclusive
AGL - Inconclusive • A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Arsenic	30 ug/L	1/22/2007	41.8 ug/L	FBC is inconclusive with 1 exceedance in 5 samples (binomial).

Monitoring Summary

Sampling period: 7/12/2006 - 12/5/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW MULHOLLAND WASH	BWBOU002.18	102224	Phelps Dodge	Permit monitoring
SITE B - BELOW COPPER CREEK	BWBOU005.11	101008	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(2-10) Arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	None	(10) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Arsenic
Missing Core Parameters	Dissolved oxygen, *E. coli*, boron, lead
Missing Seasonal Distribution	Dissolved oxygen, *E. coli*, boron, lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
Low	Collect additional arsenic samples due to the exceedance. Collect core parameters to represent at least 3 seasons during an assessment period. Use a lower lab reporting limit for dissolved cadmium.

BOULDER CREEK

Tributary at 344114 / 1130334 - Wilder Creek
15030202-006B
14.4 Miles

Category 5
Impaired

Beryllium (2010)

IMPAIRMENT STATUS

FC - Attaining • FBC - Inconclusive • AGI - Inconclusive
AGL - Inconclusive • A&Ww - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Beryllium[d]	5.3 ug/L	7/10/2006	33 ug/L	A&Ww chronic remains impaired. 3 exceedances in the assessment period. No new data since the last assessment.
		1/22/2007	10 ug/L	
		5/15/2007	7.0 ug/L	

Monitoring Summary

Sampling period: 7/10/2006 - 5/15/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW WARM SPRING CREEK	BWBOU013.05	102219	Phelps Dodge	Permit monitoring
ABOVE HILLSIDE MINE	BWBOU008.92	100401	Phelps Dodge	Permit monitoring
DOWNSTREAM OF TUNGSTONA MINE DRAIN PIPE	BWBOU012.82	102233	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(12) Arsenic, beryllium, cadmium, chromium, copper, manganese, mercury, selenium, silver, zinc	None	(12) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Dissolved oxygen, *E. coli*, boron, lead
Missing Seasonal Distribution	Dissolved oxygen, *E. coli*, boron, lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
High	Collect dissolved beryllium samples in support of TMDL development. Collect core parameters to represent at least 3 seasons during an assessment period. Use lower lab reporting limits for dissolved cadmium and dissolved silver.

Impairment Discussion
Remains impaired for beryllium (2010).

BOULDER CREEK

Wilder Creek - Butte Creek
15030202-005A
1.4 Miles

Category 4A
Not Attaining

Arsenic, copper, and zinc (1998)
Beryllium, manganese, and low pH (2006/2008)

IMPAIRMENT STATUS

FC - Attaining • FBC - Inconclusive • AGI - Inconclusive
AGL - Inconclusive • A&Ww - Not Attaining

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Arsenic	30 ug/L	7/12/2006	63.1 ug/L	FBC remains not attaining. A minimum of 10 samples is required to determine attainment. No new data since the last assessment.
		11/1/2006	30.4 ug/L	
		1/22/2007	51 ug/L	
		5/1/2007	64.9 ug/L	
Copper[d]	26.6 ug/L[acute], 16.6 ug/L[chronic] @ 206 mg/L hardness	11/1/2006	30 ug/L	A&Ww remains not attaining. No new data for this assessment period.
Zinc[d]	216.2 ug/L @ 206 mg/L hardness	11/1/2006	860 ug/L	A&Ww remains not attaining. No new data for this assessment period.
	89.8 ug/L @ 73 mg/L hardness	12/5/2007	90 ug/L	

Monitoring Summary

Sampling period: 7/12/2006 - 12/5/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW HILLSIDE MINE	BWBOU008.35	100402	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(1-5) Arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	None	(5) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Dissolved oxygen, *E. coli*, boron, lead
Missing Seasonal Distribution	Dissolved oxygen, *E. coli*, boron, lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
Medium	Collect arsenic, copper, zinc, beryllium, manganese, and pH samples during critical conditions and in critical locations. Collect core parameters to represent at least 3 seasons during an assessment period. Use a lower lab reporting limit for dissolved cadmium.

Impairment Discussion
There were no beryllium, manganese, or pH exceedances in this assessment period. However, attainment could not be determined due to the lack of data during critical conditions. TMDL for arsenic, copper, and zinc completed in 2004.

BRIDLE CREEK

Headwaters - Santa Maria River
15030203-027
25.8 Miles

Category 3
Inconclusive

PBC - Inconclusive • A&We - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
E. coli	576 cfu/100 mL, SSM	12/8/2009	2200 cfu/100 mL	PBC is inconclusive with 1 exceedance. Sample taken one day after massive winter storm.

Monitoring Summary

Sampling period: 12/8/2009 - 4/2/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW MOUNTAIN SPRINGS WASH	BWBRI009.54	102313	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(2-3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(2-3) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	*E. coli*
Missing Core Parameters	*E. coli*
Missing Seasonal Distribution	Zinc (dissolved), pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect *E. coli* samples due to exceedance. Core parameters need seasonal distribution.

BURRO CREEK

Boulder Creek - Black Canyon Creek
15030202-004
17.2 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 7/12/2006 - 12/4/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE 6 MILE CROSSING	BWBR0023.54	102244	Phelps Dodge	Permit monitoring
BELOW MAMMOTH WASH	BWBR0025.09	102243	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(3-11) Arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	None	(11) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Dissolved oxygen, *E. coli*
Missing Seasonal Distribution	Dissolved oxygen, *E. coli*, lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
Low	Collect core parameters to represent 3 seasons during assessment period. Use lower reporting limits for dissolved mercury and cadmium.

BURRO CREEK

Francis Creek - Boulder Creek
15030202-008
13.8 Miles
Outstanding Arizona Water

Category 2
Attaining some uses

FC - Attaining • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Biocriteria	IBI ≥ 50 attaining IBI 40-49 inconclusive IBI ≤ 39 violating	4/20/2010	IBI 37	A&Ww is inconclusive.

Monitoring Summary

Sampling period: 7/12/2006 - 4/20/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE BOULDER CREEK	BWBR0029.91	100404	ADEQ/Phelps Dodge	Ambient/Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(2-7) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	(2) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-7) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Biocriteria
Missing Core Parameters	Dissolved oxygen, *E. coli*
Missing Seasonal Distribution	Dissolved oxygen, *E. coli*, lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
Medium	Collect core parameters to represent at least 3 seasons during an assessment period. Use lower lab reporting limits for dissolved metals (cadmium, copper, and silver).

BUTTE CREEK

Headwaters - Boulder Creek
15030202-163
2.8 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 11/1/2006 - 12/5/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
HILLSIDE MINE AREA TRIBUTARY	BWBUT000.59	103504	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(1-3) Arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	None	(3) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Dissolved oxygen, *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Cadmium (dissolved), mercury (dissolved)

Priority	Monitoring Recommendations
Low	Collect core parameters to represent at least 3 seasons during an assessment period.

COORS LAKE

15030202-5000
230 Acres

Category 5
Impaired

Mercury in fish tissue (EPA, 2004)

IMPAIRMENT STATUS

FC - Impaired • FBC - Inconclusive • A&Ww - Inconclusive

Monitoring Summary

Sampling period: No current data

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
Mid Lake	BWCOO-B	102756	AGFD	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
None	None	None

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	All designated uses
Missing Seasonal Distribution	All designated uses
Lab Detection Limits Not Low Enough	None

Priority	Monitoring Recommendations
High	Collect fish tissue mercury samples to support TMDL development. Collect core parameters to represent at least 3 seasons during an assessment period.

Impairment Discussion
EPA listing is due to a fish consumption advisory issued in 2004.

COPPER BASIN WASH

Headwaters - Tributary at 342811/1123531
15030203-032A
4.6 Miles

Category 2
Attaining some uses

FC - Attaining • FBC - Inconclusive • AGL - Inconclusive
A&Wc - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Cadmium[d]	0.64 ug/L[chronic] @ > 400 mg/L hardness	8/21/2008	4.3 ug/L	A&Wc is inconclusive (see discussion below)
		12/16/2008	2.2 ug/L	
		12/26/2008	1.1 ug/L	
		1/23/2010	0.7 ug/L	
Copper	500 ug/L	1/23/2010	518 ug/L	AGL is inconclusive with 1 exceedance in 5 samples (binomial).
Copper[d]	49.6 ug/L[acute], 29.3 ug/L[chronic] @ >400 mg/L hardness	8/21/2008	430 ug/L	A&Wc is inconclusive (see discussion below)
		12/16/2008	170 ug/L	
		12/26/2008	160 ug/L	
		5/20/2009	150 ug/L	
		1/23/2010	99.2 ug/L	
Selenium	2 ug/L	1/23/2010	9.2 ug/L	A&Wc chronic is inconclusive. Dissolved result higher than total by more than 10%. This is also an estimate value below reporting limit. All reporting limits were higher than the chronic standard.

Monitoring Summary

Sampling period: 8/21/2008 - 1/23/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
COPPER BASIN WASH - AT FR56 BELOW COPPER BASIN MINE	BWCBW009.00	107324	ADEQ	TMDL
COPPER BASIN WASH - BELOW VICTORY STOCKPILE	BWCBW009.10	107323	ADEQ	TMDL

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
COPPER BASIN WASH - BELOW NORTH COMMERCIAL STOCKPILE	BWCBW009.38	107322	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(1-5) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, zinc	None	(1-5) Dissolved oxygen, pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Copper, selenium
Missing Core Parameters	Dissolved oxygen, *E. coli*
Missing Seasonal Distribution	Dissolved oxygen, *E. coli*
Lab Detection Limits Not Low Enough	Arsenic, cadmium, cadmium (dissolved), selenium, zinc (dissolved), mercury (dissolved)

Priority	Monitoring Recommendations
High	Collect dissolved copper and cadmium samples to reassess A&Wc attainment. (see discussion below) Collect more than 3 seasonally distributed dissolved oxygen and *E. coli* samples to complete core parameter coverage.

Attainment Discussion
While this reach is technically impaired for dissolved cadmium and copper, a closer review reveals that all or most of the exceedances came from a site (107324) immediately below an adit that was plugged in 2011. Therefore, rather than base an impairment on past data when a major change in the situation has occurred, ADEQ has decided to call the reach 'inconclusive' until enought post-adit-plugging data becomes available.

FRANCIS CREEK

Headwaters - Burro Creek
15030202-012
23.8 Miles

Category 3
Inconclusive

DWS - Inconclusive • FC - Inconclusive • FBC - Inconclusive
AGI - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Biocriteria	IBI ≥ 50 attaining IBI 40-49 inconclusive IBI ≤ 39 violating	4/19/2010	IBI 47	A&Ww is inconclusive.

Monitoring Summary

Sampling period: 2/25/2010 - 4/19/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE BURRO CREEK	BWFRA000.04	100406	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(2) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(2) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-2) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Biocriteria
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, nitrite/nitrate, fluoride, arsenic
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, nitrite/nitrate, fluoride, arsenic
Lab Detection Limits Not Low Enough	Copper (dissolved), mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect an additional macroinvertebrate sample to verify the bioassessment result. Collect core parameters to represent at least 3 seasons during an assessment period.

KNIGHT CREEK

Wheeler Wash - Big Sandy Creek
15030201-019
9.9 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Selenium	2 ug/L	2/26/2010	3.1 ug/L	A&Ww chronic is inconclusive. Only 1 exceedance in the assessment period.
SSC	80 mg/L	2/26/2010	400 mg/L	A&Ww is inconclusive. Only 1 single sample exceedance. Not enough samples to calculate a median.

Monitoring Summary

Sampling period: 2/26/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE BIG SANDY	BWKNI000.53	102311	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Selenium, SSC
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, copper, lead
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect additional total selenium and suspended sediment samples due to exceedances. Collect core parameters to represent at least 3 seasons in an assessment period.

SKULL VALLEY WASH

Headwaters - Kirkland Wash
15030203-017
19.9 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 1/23/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT SKULL VALLEY	BWSVW009.04	108782	ADEQ	TMDL
BELOW COPPER BASIN WASH	BWSVW002.82	108802	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(2) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, nickel, zinc, selenium	None	None

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, *E. coli*, cadmium (dissolved), copper (dissolved)
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, *E. coli*, cadmium (dissolved), copper (dissolved)
Lab Detection Limits Not Low Enough	Boron, cadmium (dissolved), copper, nickel, selenium

Priority	Monitoring Recommendations
Low	No exceedances but too little information to assess. All core parameters need sample number and seasonal coverage.

TROUT CREEK

Cow Creek - Knight Creek
15030201-014
32.1 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Lead[d]	4.18 ug/L[chronic] @ 160 mg/L hardness	5/19/2010	12 ug/L	A&Ww chronic is inconclusive. Only 1 exceedance in the assessment period.
Selenium	2 ug/L	4/1/2010	3.6 ug/L	A&Ww chronic is inconclusive. Only 1 exceedance in the assessment period.

Monitoring Summary

Sampling period: 4/1/2010 - 6/11/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
NEAR WIKIEUP	BWTRT002.43	100397	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(2-3) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Lead (dissolved), selenium
Missing Core Parameters	*E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect additional dissolved lead and total selenium samples due to exceedances. Collect core parameters to represent at least 3 seasons in an assessment period.

UNNAMED TRIB TO COPPER BASIN WASH TRIB

Headwaters - Unnamed Trib to Copper Basin Wash
15030203-045
0.5 Miles

Category 3
Inconclusive

PBC - Inconclusive • AWE - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Copper	1300 ug/L	1/23/2010	2270 ug/L	PBC is inconclusive with 1 exceedance in 1 sample (binomial).
Copper[d]	55.2 ug/L @ 250 mg/L hardness	1/23/2010	685 ug/L	AWE is inconclusive with 1 exceedance in 1 sample.

Monitoring Summary

Sampling period: 1/23/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COPPER BASIN ROAD	BWUUC000.01	108805	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, nickel, selenium, zinc	None	(1) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Copper (dissolved), copper
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Lab Detection Limits Not Low Enough	Arsenic, boron, cadmium, cadmium (dissolved), selenium

Priority	Monitoring Recommendations
Medium	Collect more total and dissolved copper to verify exceedances. All core parameters need number and seasonal coverage.

UNNAMED TRIB TO COPPER BASIN WASH

Headwaters - Copper Basin Wash
15030203-4291
1.2 Miles

Category 3
Inconclusive

PBC - Inconclusive • AWE - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Copper	1300 ug/L	1/23/2010	8280 ug/L	PBC is inconclusive with 1 exceedance in 1 sample (binomial).
Copper[d]	73.7 ug/L @ 340 mg/L hardness	1/23/2010	220 ug/L	AWE is inconclusive with 1 exceedance.
Lead	15 ug/L	1/23/2010	24.7 ug/L	PBC is inconclusive with 1 exceedance in 1 sample (binomial).

Monitoring Summary

Sampling period: 1/23/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT COPPER BASIN ROAD	BWUCB000.18	108804	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, nickel, selenium, zinc	None	(1) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Copper (dissolved), copper, lead
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Lab Detection Limits Not Low Enough	Boron, cadmium, cadmium (dissolved), selenium, zinc (dissolved)

Priority	Monitoring Recommendations
Medium	Collect samples to determine assessment status and contribute to Copper Basin work. All core parameters need sample number and seasonal coverage.

UNNAMED TRIB TO FINCH WASH

Headwaters - Finch Wash
15030203-044
0.5 Miles

Category 3
Inconclusive

PBC - Inconclusive • A&We - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 1/23/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COPPER BASIN ROAD	BWUFW000.01	108803	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, nickel, selenium, zinc	None	(1) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Lab Detection Limits Not Low Enough	Boron, copper (dissolved), lead, lead (dissolved)

Priority	Monitoring Recommendations
Low	No exceedances but too little information to assess. All core parameters need sample number and seasonal coverage.

Colorado – Grand Canyon Watershed

Watershed Description

This watershed is defined by the Colorado River drainage area, beginning in Arizona at Lake Powell, through the Grand Canyon National Park, to Hoover Dam at Lake Mead. It does not include the Little Colorado River drainage. The watershed contains spectacular incised canyons formed by erosion of sandstone formations, as well as volcanically formed mountains and high plateaus.

Land ownership is divided approximately as: 45% federal, 25% tribal, 15% private, and 5% state. Most of the 16,437 square miles in this watershed are sparsely populated, with an approximate population of 67,500 people (2000 census). The largest communities are Kingman and Williams. Land use is primarily open grazing, recreation, and silviculture (forestry), with scattered mining districts. The Grand Canyon National Park, Kaibab National Forest, Lake Mead National Recreation Area, and Glen Canyon National Recreation Area are all located within this watershed and all have restricted land uses to protect natural resources. These federal lands also draw a large number of tourists and recreationists.

Elevations range from 1,000 feet (above sea level) along the Colorado River to 10,400 feet near Flagstaff. The majority of the watershed is between 5,000-7,000 feet elevation, with high desert fauna and flora, including coldwater aquatic communities where perennial waters exist.

Water Resources

Precipitation varies from 10-15 inches a year, including about 1 inch of snowfall per year in higher elevations. Excluding the Colorado River and its reservoirs (Lake Powell and Lake Mead), surface water is sparse.

An estimate of surface water resources in the Colorado – Grand Canyon Watershed is provided in the following table. Waters on Tribal lands are not assessed by ADEQ; therefore, those statistics are shown separately.

Estimated Surface Water Resources in the Colorado – Grand Canyon Watershed

	Perennial	Intermittent	Ephemeral
Stream miles	480	260	14,870
	Perennial	Non-perennial	
Lake acres	68,400	13,415	

Additional Estimated Water Resources on Tribal Lands – Not Assessed

	Perennial	Intermittent	Ephemeral
Stream miles	125	5	3,740
	Perennial	Non-perennial	
Lake acres	390	0	

Ambient monitoring focuses on perennial waters; however, special investigations may identify water quality problems on intermittent and even ephemeral waters. Estimated miles and acres are based on USGS digitized hydrology at 1:100,000 and have been rounded to the nearest 5 miles or 5 acres.

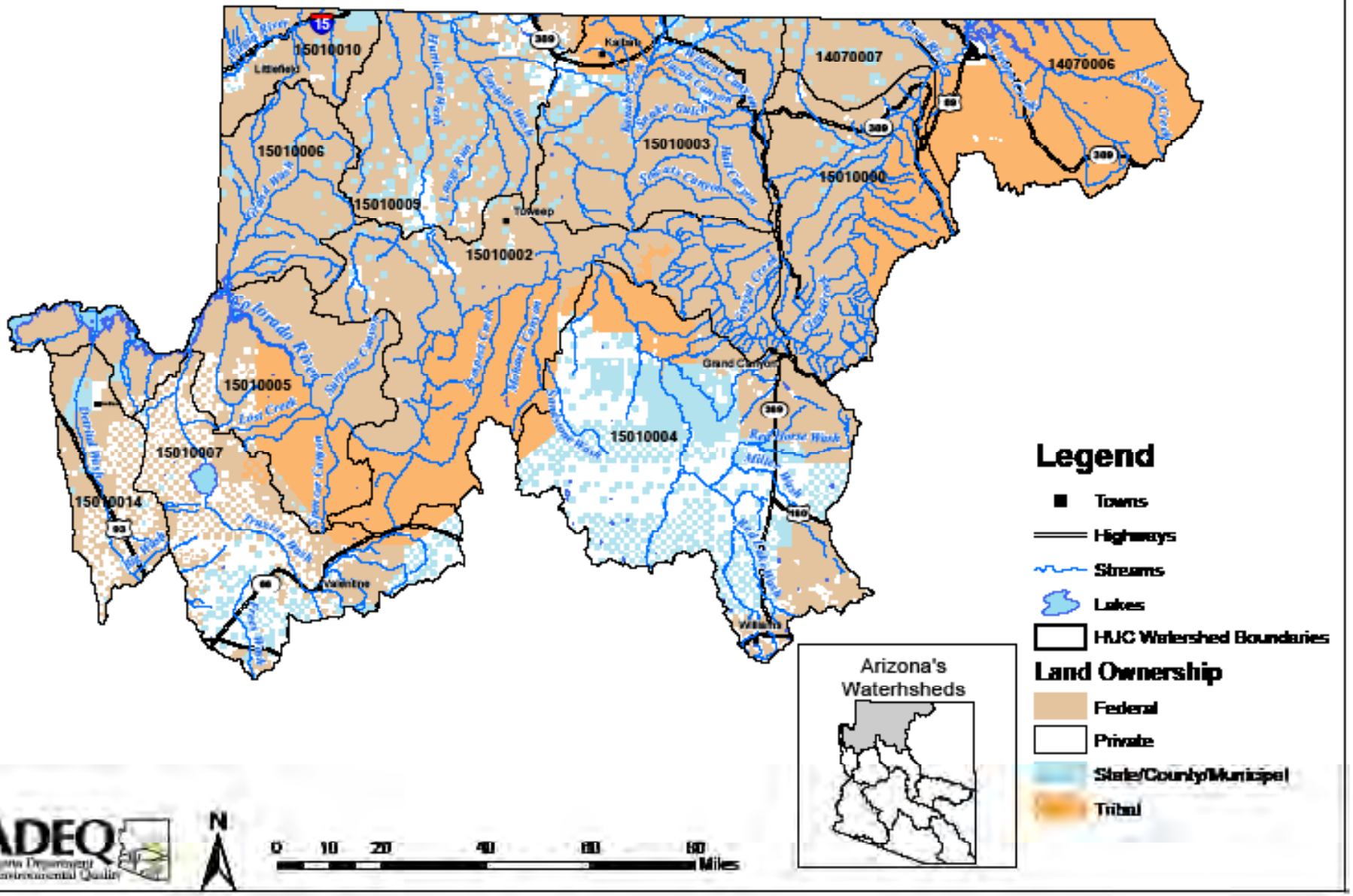
Assessments

The Colorado – Grand Canyon Watershed can be separated into the following drainage areas in Arizona:

14070006	Lake Powell
14070007	Paria River
15010001	Marble Canyon
15010002	Grand Canyon
15010003	Kanab Creek
15010004	Havasu Creek
15010005	Lake Mead
15010006	Grand Wash
15010007	Red Lake
15010009	Fort Pearce Wash
15010010	Virgin River
15010014	Detrital Wash

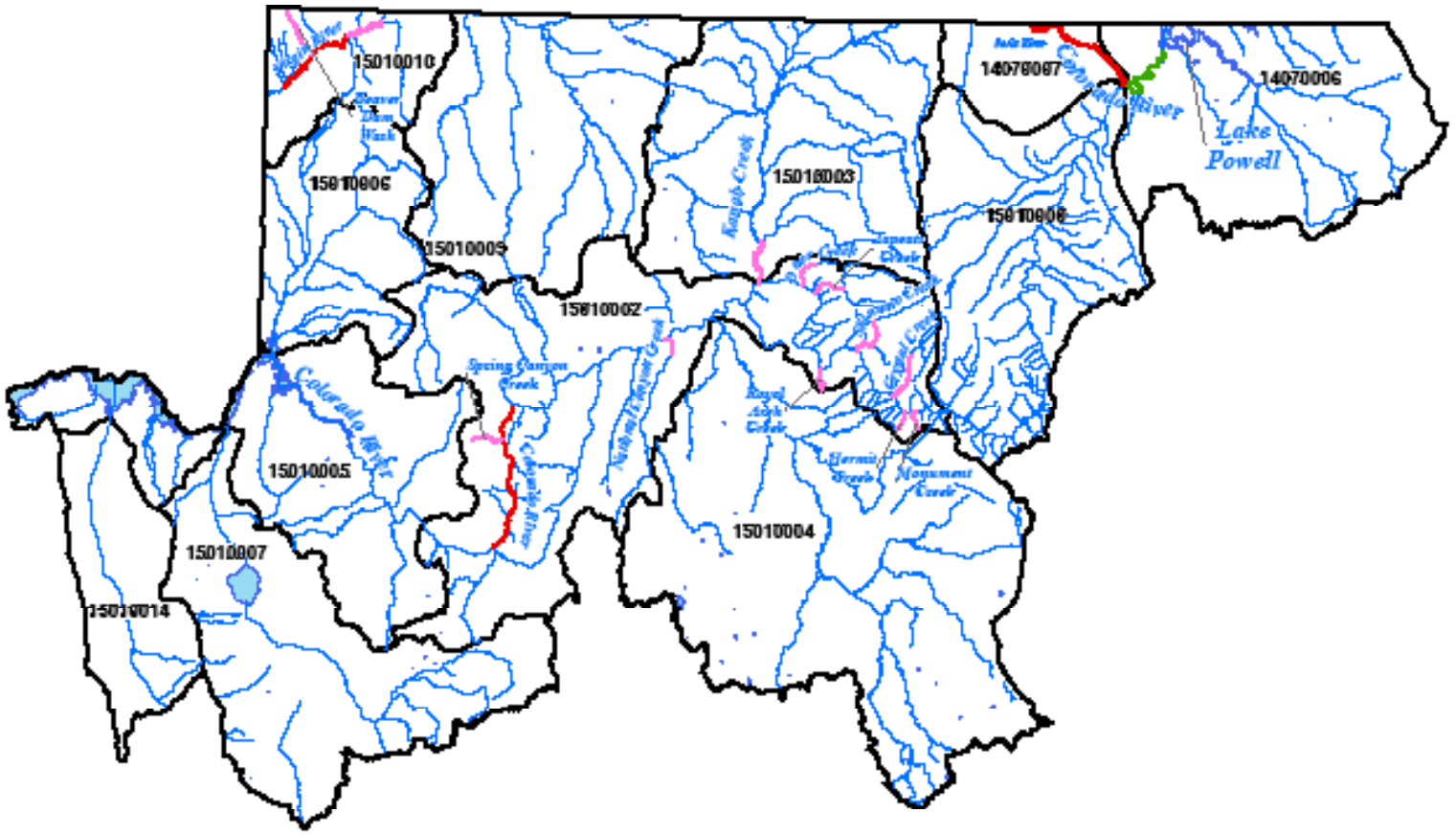
These drainage areas and the surface waters assessed as “attaining” or “impaired” are illustrated on the following watershed map. Methods used to complete these assessments are described in the “Surface Water Assessment Methods and Technical Support” document.

Colorado-Grand Canyon Watershed



Colorado - Grand Canyon

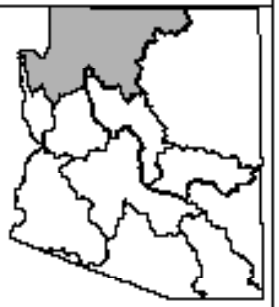
Colorado / Grand Canyon Watershed
2012/2014 Assessment for Streams and Lakes



Legend

Assessed Lakes - 2012
ADEQ and EPA Listings
- Attaining
- Inconclusive
- Not Attaining
- EPA Impaired
- Impaired
- HUC Watershed Boundaries

Assessed Streams - 2012
ADEQ and EPA Listings
- Attaining
- Inconclusive
- Not Attaining
- EPA Impaired
- Impaired
- Lakes
- Streams



See Individual HUC Printouts for Waters not Labeled

N

ADEQ Arizona Department of Environmental Quality

0 40 Miles

BEAVER DAM WASH

Utah border - Virgin River
15010010-009
9.6 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
E. coli	235 cfu/100 mL, SSM	3/9/2010	2000 cfu/100 mL	FBC is inconclusive with 1 exceedance. Note: This exceedance occurred during a storm event.
Lead	15 ug/L	3/9/2010	37 ug/L	FBC is inconclusive with 1 exceedance in 1 sample (binomial).
SSC	80 mg/L	3/9/2010	2600 mg/L	A&Ww is attaining. This exceedance occurred during a local storm event.

Monitoring Summary

Sampling period: 11/10/2009 - 4/27/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW HIGHWAY 91 BRIDGE IN LITTLEFIELD	CGBDW000.99	100449	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(2-3) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	*E. coli*, lead
Missing Core Parameters	Dissolved oxygen
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Low	Need seasonal coverage on all core parameters. Collect more *E. coli* and lead samples to determine FBC attainment.

BRIGHT ANGEL CREEK

Phantom Creek - Colorado River
15010001-019
1.9 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 10/16/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE PHANTOM RANCH	CGBRA001.36	100423	ADEQ	Ambient
BELOW PHANTOM RANCH	CGBRA000.44	100422	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(2) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(2) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-2) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Low	Need seasonal coverage on all core parameters.

COLORADO RIVER

Lake Powell - Paria River
14070006-001
16.3 Miles

Category 2
Attaining some uses

DWS - Inconclusive • FC - Attaining • FBC - Attaining
AGI - Attaining • AGL - Attaining • A&Wc - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Dissolved oxygen	7 mg/L	12/4/2007	6.5 mg/L	A&Wc is inconclusive. Low dissolved oxygen in 2 of 9 samples (binomial).
		8/19/2008	6.3 mg/L	
Mercury[d]	0.01 ug/L	3/6/2007	0.012 ug/L	A&Wc chronic is inconclusive. The exceedance on 6/5/2007 is unreliable - the dissolved fraction greater than the total value (0.008 ug/L). Only 1 valid exceedance during the assessment period.
		6/5/2007	0.011 ug/L	

Monitoring Summary

Sampling period: 8/8/2006 - 12/1/2008

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT LEES FERRY, AZ USGS 09380000	CGCLR698.93	100743	USGS	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(10) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(10) Nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(9-10) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, fluoride

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Dissolved oxygen, mercury (dissolved)
Missing Core Parameters	None
Missing Seasonal Distribution	None
Lab Detection Limits Not Low Enough	None

Priority	Monitoring Recommendations
Medium	Collect additional dissolved oxygen and dissolved mercury samples due to exceedances. Reach was originally listed for selenium in 2006, but new data (20 samples collected between 2006 and 2011) indicate no evidence of continuing selenium problems. Since there have been no exceedance measured in the last 6 years and data were collected from the same site and under similar flow conditions as the previous exceedances this reach has been delisted.

COLORADO RIVER

Parashant Canyon - Diamond Creek
15010002-003
27.6 Miles

Category 5
Impaired

IMPAIRMENT STATUS

SSC and selenium (2004)

DWS - Inconclusive • FC - Inconclusive • FBC - Inconclusive
AGI - Inconclusive • AGL - Inconclusive • A&Wc - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
SSC	25 mg/L	7/13/2006	933 mg/L	A&Wc remains impaired. All 9 single samples exceeded the standard and no exclusions for storm events.
		8/31/2006	3310 mg/L	
		11/7/2006	172 mg/L	
		2/1/2007	264 mg/L	
		3/15/2007	78 mg/L	
		4/26/2007	65 mg/L	
		6/6/2007	905 mg/L	
		7/18/2007	419 mg/L	
		8/15/2007	2190 mg/L	
Selenium[d]	2 ug/L	4/26/2007	2.2 ug/L	A&Wc chronic remains impaired with 2 exceedances. Note: These exceedances are based on dissolved selenium results.
		8/15/2007	2.1 ug/L	

Monitoring Summary

Sampling period: 7/13/2006 - 8/15/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE DIAMOND CREEK USGS 09404200	CGCLR473.00	101483	USGS	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(9 dissolved) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, zinc	(6-9) Nitrate, nitrite, nitrite/nitrate, nitrogen, phosphate, phosphorus, total Kjeldahl nitrogen	(9) Dissolved oxygen, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	*E. coli*, nitrite/nitrate, fluoride, arsenic, chromium, lead, boron, manganese, copper, lead
Missing Seasonal Distribution	*E. coli*, nitrite/nitrate, fluoride, arsenic, chromium, lead, boron, manganese, copper, lead
Lab Detection Limits Not Low Enough	None

Priority	Monitoring Recommendations
High	Collect samples to support development of suspended sediment and selenium TMDLs. Most core parameters in need of sample number and seasonal coverage.

Impairment Discussion
The reach remains impaired for selenium and SSC. ADEQ will coordinate development of selenium TMDLs along the Colorado River.

CRYSTAL CREEK

Tributary at 361342 / 1121148 - Colorado River
15010002-018B
9.1 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Arsenic	30 ug/L	10/18/2009	42 ug/L	FBC is inconclusive with 1 exceedance in 1 sample (binomial).

Monitoring Summary

Sampling period: 10/18/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COLORADO RIVER	CGCRY000.05	100525	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Arsenic
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect more arsenic samples to determine FBC attainment. All core parameters need sample number and seasonal coverage.

DEER CREEK

Tributary at 362616 / 1122816 - Colorado River
15010002-019B
4.9 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 10/20/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COLORADO RIVER	CGDEE000.07	100532	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Low	No exceedances but too little information to assess. All core parameters need coverage.

HAVASU CREEK

Havasupi Reservation - Colorodo River
15010004-001
3.3 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 10/21/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COLORADO RIVER USGS 09404115	CGHAV000.36	100568	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Low	No exceedances but too little information to assess. All core parameters need coverage.

HERMIT CREEK

Hermit Pack Trail crossing - Colorado River
15010002-020B
3.5 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Selenium	2 ug/L	10/17/2009	2.2 ug/L	A&Ww chronic is attaining. Elevated selenium concentration is considered entirely due to natural sources as there are no anthropogenic activities that can lead to selenium contamination in this small remote watershed.

Monitoring Summary

Sampling period: 10/17/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COLORADO RIVER	CGHRM000.08	100570	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Low	All core parameters need sample number and seasonal coverage.

KANAB CREEK

Jump - up Canyon - Colorado River
15010003-001
12.8 Miles

Category 3
Inconclusive

DWS - Inconclusive • FC - Inconclusive • FBC - Inconclusive
AGL - Inconclusive • A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Selenium	2 ug/L	10/20/2009	3.8 ug/L	A&Ww chronic is inconclusive. Only 1 sample in the assessment period.

Monitoring Summary

Sampling period: 10/20/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COLORADO RIVER	CGKAN000.26	100577	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, fluoride

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Selenium
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), copper, *E. coli*, nitrite/nitrate, fluoride, arsenic, chromium, lead
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), copper, *E. coli*, nitrite/nitrate, fluoride, arsenic, chromium, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect additional selenium samples due to the exceedance. All core parameters need number of sample and seasonal coverage.

LAKE POWELL

14070006-1130
9770 Acres (in Arizona)

Category 5
Impaired

Impairment

EPA mercury in fish tissue (2010)

DWS - Inconclusive • FC - Inconclusive • FBC - Inconclusive
AGI - Inconclusive • AGL - Inconclusive
A&Wc - Inconclusive

Status

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
E. coli	235 cfu/100 mL, SSM	7/11/2006	727 cfu/100 mL	FBC is attaining. 1 single sample exceedance outside the analysis window (7/2008 - 6/2011).

Monitoring Summary

Sampling period: 7/10/2006 - 9/7/2006

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT ANTELOPE MARINA	CGPOW-ANTEL	102956	NPS/USGS	Special study
AT BEACH EAST OF NPS#2	CGPOW-BEACH	103938	USGS	Special study
ABOVE ANTELOPE CREEK	CGPOW-BYANT	105116	NPS	Special study
RANDOM SITES NEAR WAHWEAP	CGPOW-RAND	105121	NPS	Special study
AT WAHWEEP MARINA	CGPOW-WWMAR	102972	NPS	Special study

Metal Samples	Nutrients & Related Samples	Other Samples
(0) None	(0) None	(14-16) *E. coli*, petroleum products, chlorinated hydrocarbons, and other VOCs

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), copper, nitrite/nitrate, fluoride, arsenic, chromium, lead, manganese, boron
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, copper, nitrite/nitrate, fluoride, arsenic, chromium, lead, manganese, boron
Lab Detection Limits Not Low Enough	None

Priority	Monitoring Recommendations
Low	Collect additional *E. coli* samples due to the exceedance. Collect core parameters to represent at least 3 seasons during an assessment period. *E. coli* problem is studied and monitored by the National Park Service.

Impairment Discussion
EPA overfile for mercury in fish tissue

MONUMENT CREEK

Headwaters - Colorado River
15010002-845
3.5 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Dissolved oxygen	6.0 mg/L	10/17/2009	4.73 mg/L	A&Ww is attaining. Low dissolved oxygen due to low flow.
Selenium	2 ug/L	10/17/2009	6.5 ug/L	A&Ww chronic is attaining. Elevated selenium concentration is considered entirely due to natural sources as there are no anthropogenic activities that can lead to selenium contamination in this small remote watershed.

Monitoring Summary

Sampling period: 10/17/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COLORADO RIVER	CGMON000.19	101434	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Low	All core parameters need sample number and seasonal coverage. Use a lower detection limit for dissolved mercury (one A&W chronic exceedance in 2005).

NATIONAL CANYON CREEK

Headwaters - Colorado River
15010002-016
3.2 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Selenium	2 ug/L	10/22/2009	4.6 ug/L	A&Ww chronic is attaining. Elevated selenium concentration is considered entirely due to natural sources as there are no anthropogenic activities that can lead to selenium contamination in this small remote watershed.

Monitoring Summary

Sampling period: 10/22/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COLORADO RIVER	CGNAT000.48	100602	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), pH, *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), pH, *E. coli*
Lab Detection Limits Not Low Enough	None

Priority	Monitoring Recommendations
Low	Collect core parameter samples over three season period.

PARIA RIVER

Utah border - Colorado River
14070007-123
29.4 Miles

Category 5
Impaired

IMPAIRMENT

E. coli (2006/8) and SSC (2004)

STATUS

FC - Attaining • FBC - Impaired • A&Ww - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Arsenic	30 ug/L	3/30/2010	34 ug/L	FBC is inconclusive. 1 exceedance in 3 samples (binomial).
Chromium	100 ug/L	2/9/2010	160 ug/L	FBC is inconclusive. 1 exceedance in 3 samples (binomial).
Lead	15 ug/L	2/9/2010	170 ug/L	FBC is inconclusive. 2 exceedances in 3 samples (binomial).
		3/30/2010	140 ug/L	
SSC	80 mg/L	2/9/2010	27500 mg/L	A&Ww remains impaired (2004). Both exceedances occurred during local storm events and were excluded from the median value determination. Insufficient number of samples left to assess.
		3/30/2010	7600 mg/L	
Biocriteria	IBI ≥ 50 attaining IBI 40-49 inconclusive IBI ≤ 39 violating	6/8/2010	IBI 40	A&Ww is inconclusive.

Monitoring Summary

Sampling period: 2/9/2010 - 6/8/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT LEES FERRY, AZ	CGPAR000.49	101073	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-3) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Arsenic, chromium, lead, biocriteria
Missing Core Parameters	*E. coli*
Missing Seasonal Distribution	*E. coli*
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
High	Collect additional *E. coli* and suspended sediment samples to support TMDL development. Collect arsenic, chromium, and lead samples due to exceedances. Collect an additional macroinvertebrate sample to verify the bioassessment result.

Impairment Discussion
Reach remains impaired for *E. coli* (2006) and Suspended Sediment (2004). TMDLs for these parameters will be initiated in 2014.

ROYAL ARCH CREEK

Headwaters - Colorado River
15010002-871
5.1 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Selenium	2 ug/L	10/19/2009	8.2 ug/L	A&Ww chronic is attaining. Elevated selenium concentration is considered entirely due to natural sources as there are no anthropogenic activities that can lead to selenium contamination in this small remote watershed.

Monitoring Summary

Sampling period: 10/19/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COLORADO RIVER	CGRYA000.05	100632	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Low	All core parameters need sample number and seasonal coverage.

SHINUMO CREEK

Tributary at 361821 / 1121803 - Colorado River
15010002-029B
8.8 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 10/18/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COLORADO RIVER	CGSHI000.05	101436	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Low	No exceedances but too little information to assess. All core parameters need coverage.

SPRING CANYON CREEK

Headwaters - Colorado River
15010002-318
6.0 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Selenium	2 ug/L	10/25/2009	2.1 ug/L	A&Ww chronic is attaining. Elevated selenium concentration is considered entirely due to natural sources as there are no anthropogenic activities that can lead to selenium contamination in this small remote watershed.

Monitoring Summary

Sampling period: 10/25/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COLORADO RIVER	CGSPG000.17	100648	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Low	All core parameters need sample number and seasonal coverage.

TAPEATS CREEK

Headwaters - Colorado River
15010002-696
12.8 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Wc - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 10/20/2009

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT COLORADO RIVER	CGTAP000.08	100662	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*
Lab Detection Limits Not Low Enough	Cadmium (dissolved), mercury (dissolved)

Priority	Monitoring Recommendations
Low	No exceedances but too little information to assess. All core parameters need coverage.

VIRGIN RIVER

Black Rock Gulch - Sullivans Canyon
15010010-006
10.3 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGI - Inconclusive
AGL - Inconclusive • A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
E. coli	235 cfu/100 mL, SSM	3/9/2010	460 cfu/100 mL	FBC is inconclusive. Only 1 single sample exceedance in the last 3 years of monitoring. Note: This exceedance occurred during a storm event.
Selenium	2 ug/L	11/9/2009	2.1 ug/L	A&Ww is inconclusive with only one event at one site on one day.
SSC	80 mg/L	3/9/2010	911 mg/L	A&Ww is attaining. Both exceedances occurred during local storm events.
		4/27/2010	1100 mg/L	
Bottom deposits	50%	6/15/2010	89%	A&Ww is inconclusive with only one exceedance during the assessment period.

Monitoring Summary

Sampling period: 11/9/2009 - 6/15/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT I-15 REST STOP	CGVGR052.23	100679	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-4) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, bottom deposits

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Selenium, bottom deposits, *E. coli*
Missing Core Parameters	Dissolved oxygen
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, cadmium (dissolved), copper (dissolved), *E. coli*, boron, manganese, copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect more *E. coli*, selenium, and bottom deposits samples due to exceedances. Need seasonal coverage on most core parameters.

VIRGIN RIVER

Sullivans Canyon - Beaver Dam Wash
15010010-004
9.7 Miles

Category 5
Impaired

IMPAIRMENT

Add selenium to the 303(d) list.

STATUS

FC - Attaining • FBC - Inconclusive • AGI - Attaining
AGL - Attaining • A&Ww - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
E. coli	235 cfu/100 mL, SSM	3/9/2010	346 cfu/100 mL	FBC is inconclusive. Only 1 single sample exceedance in the last 3 years of monitoring. Note: This exceedance occurred during a storm flow.
Selenium	2 ug/L	11/10/2009	2.4 ug/L	A&Ww is impaired with two exceedances out of four samples, average 1.3 times standard, over 6-7 month period (see discussion).
		6/16/2010	2.9 ug/L	
SSC	80 mg/L	3/9/2010	825 mg/L	A&Ww is attaining. Both exceedances occurred during local storm events.
		4/27/2010	982 mg/L	

Monitoring Summary

Sampling period: 11/10/2009 - 6/16/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT LITTLEFIELD, AZ	CGVGR039.41	100680	ADEQ	Ambient
AT MOUTH OF NARROWS	CGVGR044.58	101835	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(4) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(4) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(3-5) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	*E. coli*
Missing Core Parameters	None
Missing Seasonal Distribution	Dissolved oxygen
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
High	Good core parameter coverage with small number of samples. Collect more *E. coli* to determine FBC status and selenium to support development of TMDL.

Impairment Discussion
Impaired for selenium but not much data to assess overall situation. Only 6 total and 17 dissolved selenium values 1977-2005 with switch from dissolved to total after 1977. Large time gaps between samples (1977-1994-2005) and no seasonal distribution. Last three total Se rather high (two shown plus 7.2 in 2004).

VIRGIN RIVER

Beaver Dam Wash - Big Bend Wash
15010010-003
10.1 Miles

Category 5
Impaired

IMPAIRMENT STATUS

SSC and selenium (2004) and E. coli (2010)

FC - Inconclusive • FBC - Impaired • AGI - Inconclusive
AGL - Inconclusive • A&Ww - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Boron[d]	1000 ug/L	6/17/2008	1010 ug/L	AGI is inconclusive (binomial).
E. coli	235 cfu/100 mL, SSM	8/24/2006	1500 cfu/100 mL	FBC remains impaired. No new data since last assessment.
		9/29/2006	13000 cfu/100 mL	
		3/9/2007	280 cfu/100 mL	
		12/17/2008	1400 cfu/100 mL	
Selenium[d]	2 ug/L	6/17/2008	2.1 ug/L	A&Ww remains impaired with 2 exceedances.
		12/17/2008	2.1 ug/L	
SSC	80 mg/L	12/20/2007	746 mg/L	A&Ww remains impaired. Exceedances on 6/17/08, 8/21/08, and 12/17/08 occurred during storm events. No new data since last assessment.
		3/10/2008	457 mg/L	
		6/17/2008	92 mg/L	
		8/21/2008	136 mg/L	
		12/17/2008	601 mg/L	

Monitoring Summary

Sampling period: 8/24/2006 - 12/17/2008

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT LITTLEFIELD, AZ USGS 09415000	CGVGR038.80	101836	USGS	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(6 dissolved) Arsenic, boron, iron, selenium	(6) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-7) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, fluoride

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Boron
Missing Core Parameters	Zinc (dissolved), cadmium (dissolved), copper (dissolved), boron, manganese, copper, lead
Missing Seasonal Distribution	Zinc (dissolved), cadmium (dissolved), copper (dissolved), boron, manganese, copper, lead
Lab Detection Limits Not Low Enough	N/A

Priority	Monitoring Recommendations
High	Collect samples to support development of selenium, suspended sediment, and *E. coli* TMDLs. Collect additional boron samples due to the exceedance. Collect core parameters to represent at least 3 seasons during the assessment period.

Impairment Discussion
Reach remains impaired for SSC and selenium (2004) and *E. coli* (2010). No new data since last assessment.

Colorado – Lower Gila Watershed

Watershed Description

This watershed is defined by the Colorado River drainage area, from Hoover Dam at Lake Mead to the Mexico border near Yuma. It does not include the Bill Williams River drainage or the Gila River above Painted Rocks Dam.
Land ownership is divided approximately as: 89% federal, 6% state, 4% tribal, and 1% private. Except for communities along the Colorado River (e.g., Yuma, Bullhead City, Lake Havasu City, Kingman), most of this 14,459 square mile watershed is sparsely populated with only 187,700 people (2000 census).

Due in part to the sparse population, six wildlife refuges and three wilderness areas have been established in this watershed, along with several military bases with live fire exercise areas. All of these have restricted land uses. Tribal and private land is primarily along the Colorado River and lower Gila River and is intensively cultivated. Open grazing occurs across the watershed.

Elevations range from 5,450 feet (above sea level) in the mountains near Lake Mohave to 80 feet along the Colorado River as it flows into Mexico. The area contains low desert fauna and flora, and support warmwater aquatic communities where perennial waters exist.

Water Resources

Precipitation is meager, varying from 3 to 10 inches a year. Perennial water is limited to the Colorado River mainstem and its reservoirs, with irrigation return flow providing perennial flow in the Gila River near Yuma.

An estimate of surface water resources in the Colorado – Lower Gila Watershed is provided in the following table. Waters on Tribal lands are not assessed by ADEQ; therefore, those statistics are shown separately.

Estimated Surface Water Resources in the Colorado – Grand – Lower Gila Watershed

	Perennial	Intermittent	Ephemeral
Stream miles	375	145	13,545
	Perennial	Non-perennial	
Lake acres	36,860	0	

Additional Water Resources on Tribal Lands – Not Assessed

	Perennial	Intermittent	Ephemeral
Stream miles	75	0	535
	Perennial	Non-perennial	
Lake acres	245	0	

Ambient monitoring focuses on perennial waters; however, special investigations may identify water quality problems on intermittent and even ephemeral waters. Estimated miles and acres are based on USGS digitized hydrology at 1:100,000 and have been rounded to the nearest 5 miles or 5 acres.

Assessments

The Colorado – Lower Gila Watershed is separated into the following drainage areas (subwatersheds):

15030101	Mohave -Havasu
15030103	Sacramento Wash
15030104	Imperial Reservoir
15030105	Bouse Wash
15030106	Tyson Wash
15030107	Lower Colorado
15030108	Yuma Desert
15070201	Lower Gila
15070202	Tenmile Wash
15070203	San Cristobal Wash

These drainage areas and the surface waters assessed as “attaining” or “impaired” are illustrated on the following watershed map. Methods used to complete these assessments are described in the “Surface Water Assessment Methods and Technical Support” document.